



PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

April 27, 2007

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Applicant: Shigetaka HAGA

For: ELECTRON BOMBARDMENT HEATING APPARATUS AND TEMPERATURE
CONTROLLING APPARATUS AND CONTROL METHOD THEREOF

Serial No.: 10/821 081 Group: 1725

Confirmation No.: 1128

Filed: April 8, 2004 Examiner: Heinrich

Atty. Docket No.: 4372.P0051US

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

LETTER TRANSMITTING APPEAL BRIEF FEE

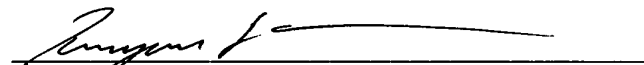
Sir:

Enclosed is Appellant's check in the sum of \$250.00,
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overpayment, to Deposit Account No. 06-1382. A duplicate copy
of this sheet is enclosed.

Respectfully submitted,

IN DUPLICATE

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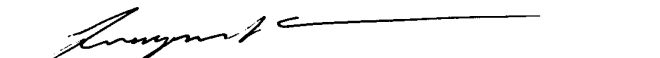
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Appellant's Brief on Appeal including enclosures

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Terryence F. Chapman

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APPELLANT'S BRIEF ON APPEAL

Sir:

This is an appeal from the decision of the Examiner dated
September 27, 2006, finally rejecting Claims 2-4 and 9-11.

REAL PARTY IN INTEREST

Sukegawa Electric Co., Ltd. is the assignee of the
present application and the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences to the
present application.

STATUS OF CLAIMS

Claims 2-4 and 9-11 have been rejected and are the claims
under consideration on appeal. Claims 5-8 have been withdrawn
from consideration and Claim 1 has been canceled.

STATUS OF AMENDMENTS

A Request for Reconsideration dated January 26, 2007 has
been considered by the Examiner.

SUMMARY OF CLAIMED SUBJECT MATTER

Appellant's invention, as defined by independent Claim 9, is directed to an electron bombardment heating apparatus for heating a material which comprises a filament for emitting thermions therefrom, means for accelerating the thermions emitted from the filament toward a heating plate, the heating plate which is heated by bombardment of the accelerated thermions and serves as a means for supporting the material to be heated and a supporting member having the heating plate provided at a top portion thereof, vertically disposed cylindrical peripheral wall portions which have a different diameter from each other and a horizontally disposed annular wall portion which extends in a radial direction and connects the vertically disposed cylindrical peripheral wall portions with each other (Figures 1 and 4 and in the clean copy of the substitute specification, page 5, lines 33-36 and page 6, lines 1-12).

Claim 2 limits Claim 9 in requiring that the supporting member is made of a ceramic (clean copy of substitute specification, page 11, lines 4-6).

Claim 3 limits Claim 2 in requiring that the supporting member is made of silicon carbide impregnated with silicon (clean copy of substitute specification, page 11, lines 4-6).

Claim 10 limits Claim 9 in requiring that plural reflectors be provided at the rear side of the filament (clean copy of substitute specification, page 12, first full paragraph and Figure 1).

Claim 4 limits Claim 10 in requiring that a heat-resistant insulator plate be inserted between the plural reflectors (Figure 5 and clean copy of substitute specification page 20, first full paragraph).

Claim 11 limits Claim 9 in requiring that the vertically disposed cylindrical peripheral wall portions comprise an upper vertically disposed cylindrical peripheral wall portion and a lower vertically disposed cylindrical peripheral wall portion and the upper vertically disposed cylindrical

peripheral wall portion has a greater diameter than the lower vertically disposed cylindrical peripheral wall portion (Figure 4 and clean copy of substitute specification page 19, first full paragraph).

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Appellant respectfully requests review of the final rejection of Claims 2-4 and 9-11 under 35 USC 103(a) as being unpatentable over Appellant's admitted prior art (AAPA) or JP 2000-036370A (JP '370) in view of JP 35-5165288A (JP '288) and further in view of JP 40-4224628A (JP '628).

ARGUMENT

Electron bombardment heating is a process for heating in which accelerated electrons strike or impinge the rear surface of a heating plate to generate heat therein so that the heating plate serves as a means for heating a plate-like material, such as a semiconductor wafer, placed thereon. In conventional apparatuses for performing this type of heating, a heating material supporting member is typically formed from heat-resistant silicon carbide impregnated with silicon or a ceramic and is subjected to thermal stress. At the commencement of the heating of the heating plate, the heating plate undergoes thermal expansion which causes the heated material supporting member to deform and concentrate thermal stress on a shoulder portion and repeated heating and cooling of the heating plate causes the heated material supporting member to repeatedly undergo thermal stress, eventually fatigue and deteriorate and finally break.

After performing extensive studies regarding the problems associated with conventional electron bombardment heating apparatuses, the present inventors discovered that when a supporting member is used which comprises vertically disposed cylindrical peripheral wall portions having different radiuses, the thermal stress that is generated during the heating of the heating plate is relieved or mitigated such

that the heating material supporting member hardly fatigues and breaks, even during repeated heating and cooling steps.

The present invention is directed to an electron bombardment heating apparatus for heating a material and comprises a filament for emitting thermions therefrom, means for accelerating the thermions emitted from the filament toward a heating plate, a heating plate which is heated by bombardment of the accelerated thermions and serves as a means for supporting the material to be heated, and a supporting member having the heating plate provided at a top portion thereof, vertically disposed cylindrical peripheral wall portions which have a different diameter from each other and a horizontally disposed annular wall portion which extends in a radial direction and connects the vertically disposed cylindrical peripheral wall portions with each other. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

REJECTION OF CLAIMS 2-4 AND 9-11 UNDER 35 USC 103(a)
AS BEING UNPATENTABLE OVER AAPA OR JP '370 AND
FURTHER IN VIEW OF JP '288 AND
FURTHER IN VIEW OF JP '628

AAPA and JP '370 both disclose electron bombardment heating apparatuses in which a flat heating plate is heated by accelerated thermions from a filament to heat a thin-flat object placed thereon. These prior art electron bombardment heating apparatuses both have no disclosure with respect to varying the diameter of peripheral wall portions of a supporting member in order to reduce the effects of thermal expansion during heating and thereby avoid thermal stress at the junction of vertically disposed cylindrical peripheral wall portions making up the supporting member and the heating plate. Therefore, the secondary references cited by the Examiner must provide the motivation to one of ordinary skill in the art to modify AAPA and JP '370 in a manner that would yield the presently claimed invention. It is respectfully

submitted that the secondary references contain no such disclosures.

JP '288 discloses an ion beam device in which an inert gas, such as argon supplied from a gas lead-in pipe 12, is discharged and ionized between an anode chamber 11 and cathode electrode 13. The density of the plasma is controlled by a solenoid 14 and the ions are drawn out in beam form by an acceleration part 2 to impinge upon a metal mold 8. Although the chamber of the ion beam device of JP '288 does have peripheral wall portions with two different diameters, the peripheral wall portions do not serve as a supporting member having a heating plate placed at a top portion thereof which serves as a means for supporting the material to be heated. There is no heating plate in JP '288 that thermions impinge upon so the problem of thermal stress arising in the peripheral wall portions of the supporting member joined to the heating plate does not arise in this reference. In JP '288, the mold in the lower portion of the chamber is struck by ion beams in contrast to a heating plate attached to peripheral wall portions being heated by thermions as is required by the present invention. There is no suggestion in JP '288 which would motivate one of ordinary skill in the art to modify the electron bombardment heating apparatuses discussed in AAPA or JP '370 in a manner that would yield the present invention. Only hindsight provided by Appellant's disclosure is motivating the Examiner to cite the ion beam apparatus of JP '288. Appellant respectfully submits that the attempted combination of JP '288 with the primary references is in error.

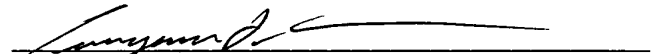
JP '628 discloses an electron beam irradiation apparatus which comprises a shield body 4 fitted below a strip at both sides of electron beam gun 6. The Examiner has cited this reference as showing the use of a shielding body to prolong an electron beam irradiation apparatus' service life. However, like the previously discussed secondary reference, given the completely different operation between the electron beam

device of JP '628 and the electron bombardment heating apparatuses of AAPA and JP '370, any disclosure regarding a shielding body in JP '628 would not be considered relevant to one of ordinary skill in the art due to the electron bombardment heating apparatuses of the primary references. Therefore, Appellant respectfully submits that the references cited by the Examiner, in combination, do not even present a showing of prima facie obviousness under 35 USC 103(a) with respect to the presently claimed invention.

CONCLUSION

For the reasons advanced above, it is respectfully submitted that the Examiner's rejection of Claims 2-4 and 9-11 under 35 USC 103(a) as being unpatentable over either of Applicant's admitted prior art or JP 2000-036370 further in view of JP 35-5165288A and further in view of JP 40-4224628A is in error and should be reversed. Favorable consideration is respectfully solicited.

Respectfully submitted,


Terryence F. Chapman

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	Steven R. Thiel	Reg. No. 53 685
	Donald J. Wallace	Reg. No. 43 977
	Sidney B. Williams, Jr.	Reg. No. 24 949

Encl: Claims Appendix (2-4 and 9-11)
Evidence Appendix
Related Proceedings Appendix
Postal Card

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CLAIMS APPENDIX

2. The electron bombardment heating apparatus, as described in the claim 9, wherein said supporting member is made of ceramic.

3. The electron bombardment heating apparatus, as described in the claim 2, wherein said supporting member is made of silicon carbide impregnated with silicon.

4. The electron bombardment heating apparatus as described in the claim 10, wherein a heat-resistive insulator plate is inserted between the plural reflectors.

9. An electron bombardment heating apparatus for heating a material, comprising:
a filament for emitting thermions therefrom;
means for accelerating the thermions emitted from the filament towards a heating plate;
a heating plate which is heated by bombardment of the accelerated thermions and serves as a means for supporting the material to be heated; and
a supporting member having the heating plate provided at a top portion thereof, vertically disposed cylindrical peripheral wall portions which have a different diameter from each other and a horizontally disposed annular wall portion which extends in a radial direction and connects the vertically disposed cylindrical peripheral wall portions with each other.

10. The electron bombardment heating apparatus of Claim 9, additionally comprising plural reflectors provided at a rear side of the filament.

11. The electron bombardment heating apparatus of Claim 9, wherein the vertically disposed cylindrical peripheral wall portions comprise an upper vertically disposed cylindrical peripheral wall portion and a lower vertically disposed cylindrical peripheral wall portion and the upper vertically disposed cylindrical peripheral wall portion has a greater diameter than the lower vertically disposed cylindrical peripheral wall portion.

EVIDENCE APPENDIX

There is no other evidence relied upon by the Appellant.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings.